

# Student projects proposed by members of the Adur & Ouse Catchment Partnership – January 2017

## Contact points for groups of projects

- 1) **Gareth Williams**, Catchment Co-ordinator/Environment Programme | Solent and South Downs Area, Adur and Ouse and Arun and Western streams, Environment Planning and Engagement, Environment Agency, Guildbourne House, Chatsworth Road, Worthing, West Sussex BN11 1LD
- 2) **Sean Ashworth**, Deputy Chief Fisheries and Conservation Officer, Sussex Inshore Fisheries and Conservation Authority, 12A Riverside Business Centre, Brighton Road, Shoreham-by-Sea, West Sussex BN43 6RE.
- 3) **Crispin Scott**, National Trust Wildlife & Countryside Adviser, London & South East, 1-2 The Courtyard, Wisley, Surrey GU23 6QL.
- 4) **Matthew Woodcock**, Partnership and Expertise Manager South East, Forestry Commission - South East & London, Bucks Horn Oak, Farnham, Surrey GU10 4L.
- 5) **Aimee Felus**, Brighton ChaMP Project Manager, South Downs National Park Authority, South Downs Centre, North Street, Midhurst, West Sussex GU29 9DH.

- 
- 1) **Gareth Williams** - [gareth.williams@environment-agency.gov.uk](mailto:gareth.williams@environment-agency.gov.uk)

### River restoration appraisal

Projects assessing hydrogeomorphological, ecological, biogeochemical and social outcomes of river restoration projects in urban and rural settings. Projects tend to be field based and some can build on previous masters/ PhD/ other research to assess outcomes over longer time scales. In some cases there is potential for desk-based analysis of secondary data. A range of projects and potential partner organisations available depending on location(s).

Example partner organisations: The Wandle Trust/ South East Rivers Trust, Atkins Global, Sussex Wildlife Trust.

### Use of large wood in river restoration

To date there has been 4 years of R&D work on wood in river restoration in collaboration with the Environment Agency. Projects have included appraisal of the geomorphological, hydraulic, ecological and biogeochemical role of restored large wood in lowland rivers. Field sites include the River Blackwater (Hampshire) and the River Bure (Norfolk). Also potential for desk-based research including analysis of the National River Restoration Inventory (NRRRI) hosted by the River Restoration Centre.

Example partner organisations: Environment Agency, National Trust, RRC.

### Managed realignment and salt marsh restoration

Managed realignment (MR) is a coastal restoration technique used across Europe and the USA to re-create salt marsh habitats and deliver sustainable coastal defence. MR also has the potential to deliver additional ecosystem services e.g. carbon sequestration and water purification. There is potential for projects appraising the geomorphological, hydrological, ecological and biogeochemical functioning of MR sites in comparison to their natural counterparts to inform MR approaches and improve delivery of ecosystem services.

### Development and testing of frameworks and methods for river assessment

Some of the recent and current research projects within the School have focused on development of new frameworks and methods for assessing rivers and estuaries (e.g. Urban River Survey, REFORM, Ecostatus, Estuary Edge Survey for urban tidal rivers and estuaries). There are a number of opportunities for projects

evaluating, testing and developing these assessment approaches which can incorporate field work, desk based analysis, or a combination.

Example project partners: Environment Agency.

### **Analysis of river/ wetland dynamics using remotely sensed data**

There is a vast array of freely available global remotely sensed data sets that may be used to analyse environmental change at large spatial scales and over long time scales in a range of environments (e.g. braided rivers, peatlands, floodplain forests). This enables a range of projects exploring consequences of environmental change on freshwater systems. These projects are desk based, requiring processing of remotely sensed data and geospatial analysis techniques.

### **Numerical modelling of land use/ climate change impacts on fluvial systems**

Projects examining the effects of land use changes (e.g. urbanisation, afforestation) or predicted future changes in precipitation on catchment sediment yields and/or river channel morphology. Research would be undertaken using a numerical model (e.g. CAESAR-Lisflood, <https://sourceforge.net/projects/caesar-lisflood/>).

### **Flood inundation modelling**

Projects can incorporate 1D, or 1-2D coupled modelling. Examples include modelling the impacts of climate change on flood risk, evaluation of flood risk mitigation objectives in river restoration design, analysis of the influence of restored wood jams on hydraulics/ flood risk, representing the influence of beaver dams on flow hydraulics.

Example partner organisations: Environment Agency.

### **Developing urban ‘rainscapes’: Sustainable urban Drainage Systems**

Certain new urban developments must now incorporate sustainable drainage systems (SuDS) such as green roofs, rain gardens, permeable pavements and bio-retention basins into their design. There is also a lot of ongoing work to ‘retrofit’ SuDS to existing developments. The scientific and technological basis for SuDS is still evolving, and there is potential for a range of projects including feasibility assessments (desk-based), spatial analysis of schemes (desk-based) and monitoring and appraisal of schemes in London (or elsewhere).

Example partner organisations: Thames21, Enfield Council, Hammersmith and Fulham Council.

### **Impacts of invasive species on sediment dynamics**

All of the Environment Agency’s “top ten most wanted” invasive species inhabit river corridors and several are known to influence sediment dynamics. Potential projects include desk-based analysis of species distributions using secondary data, combining this with biophysical habitat data to assess potential for impacts, and field based projects assessing geomorphological impacts of key invasives.

Example partner organisations: Environment Agency.

### **Meiofauna in chalk streams**

Projects exploring diversity, population densities and habitat preferences of meiofauna (e.g. Ostracods) in chalk streams: an important and rare habitat. Ostracods are an important component of the meiofauna of chalk streams but little is known about their ecology and distribution in the Chilterns chalk streams. Potential for projects assessing species occurrence, projects exploring diversity, abundance and species preferences in different patch habitats in chalk streams, and projects assessing which species are indicative of groundwater discharges.

Example partner organisations: The Chiltern Chalk Streams Project.

### **Urban river water/ sediment quality**

Urban rivers are exposed to pollution from a range of sources, with severe implications for river health. These issues also have the potential to undermine urban river restoration efforts. The Geography Laboratories can support analysis of water and sediment quality (nutrients, heavy metals). Projects could include analysis of fine sediment impacts on river health and potential strategies for restoration, assessment of heavy metal contamination of river sediments, assessment of nutrient levels in degraded/ restored sites.

Example project partners: Environment Agency, Wandle Trust, Thames21.

### **Analysing physical characteristics of soils and sediments in 3D**

X-ray microtomography ( $\mu$ CT) is a non-destructive technique capable of producing three-dimensional models derived from the attenuation of X-ray energy. The method can be used to quantify the physical structure and porosity of soils and sediments. Potential for projects exploring physical characteristics of sediments in degraded/ restored/ natural wetlands, or testing and developing methods for application in different environmental contexts e.g. organic wetland soils (peat). Primarily lab-based projects requiring assistance from lab technicians.

### **Pollution risks from landfill sites (potential supervisors (KS))**

Currently there are > 50 historical landfills that are considered at risk of flooding and/or erosion in the Tidal River Thames. In addition, there is preliminary evidence to suggest that some sites are already actively eroding and releasing contaminated material to the foreshore. There are opportunities for projects using secondary data from the Environment Agency and field investigations of the integrity of landfill site boundaries.

Example partner organisations: London Waterkeeper <http://londonwaterkeeper.org.uk>; Environment Agency.

#### **2) Sean Ashworth - [S.ashworth@sussex-ifca.gov.uk](mailto:S.ashworth@sussex-ifca.gov.uk)**

- What are the costs and benefits of fishing activity in the Sussex marine environment?
- How is specific fisheries management working in Sussex marine waters?
- What is the distribution of juvenile marine fish species in Sussex?
- How do we best communicate the marine environment to the public?
- What is the public perception of marine fish?
- What is the public perception of the marine environment?
- How do we use existing data to map marine species in Sussex?
- How do we use existing data to map marine habitats in Sussex?

#### **3) Crispin Scott - [Crispin.Scott@nationaltrust.org.uk](mailto:Crispin.Scott@nationaltrust.org.uk)**

- The effectiveness of floodplain restoration at Sheffield Park (National Trust).
- River restoration in incised rivers such as the Upper and Middle Ouse.
- Dragonflies (or other iconic species) as indicators of riparian restoration.
- The effectiveness of eel passes on the Ouse.
- Crayfish interactions (potentially native and non-native) at Nymans estate (National Trust).
- Access – advantages and disadvantages of increased visitor numbers to the Sheffield Park floodplain.
- How can a floodplain restoration project (e.g. at Sheffield Park) benefit the local communities through Ecosystem Services such as increased visitor interest, economic benefits etc.?

#### **4) Mathew Woodcock - [Matthew.Woodcock@forestry.gsi.gov.uk](mailto:Matthew.Woodcock@forestry.gsi.gov.uk)**

- Trees by rivers (e.g. the Uck): what would encourage landowners to implement Natural Flood Management (NFM) options (including detailed cost models)?
- Given that water companies are exploring how 'up stream' action might reduce the costs of downstream work, what opportunities are there for woodland to improve water quality?
- What opportunities are there for leaky woody dams (probably to be supported by Countryside Stewardship schemes) to be sited in strategic locations in the High Weald to help slow flood flows?
- Removing riverine blockages: farmers vs civil engineering contractors – lessons and experience from Twineham Farm?

**5) Aimee Felus - [Aimee.Felus@southdowns.gov.uk](mailto:Aimee.Felus@southdowns.gov.uk)**

- Monitoring a nitrate precision farming trial for effectiveness in groundwater protection
- Monitoring remediation of road run-off pollutants in rain gardens using multi-level samplers
- Monitoring slug abundance during cover crop trials
- Investigating effect on nitrate infiltration and mobilisation in soil during cover crop trials
- A feasibility study of the use of horse manure on farms as a sustainable business
- Investigating public awareness of and behaviours associated with the aquifer and its use as a source for water supply